

Questions and recommendations
for the next phase of QEAFATE model development for Portland Harbor
11-19-09

- 1) Requests for clarification of 11-18-09 presentation
 - a) *For sediment bed initial concentrations, I assume color-coded maps are just for visualization for this presentation, and that you actually use numeric values in the model—is that correct? Or do you use the ranges specified on the maps?*
 - b) *What is the data source for chemical concentrations in upstream suspended sediment load?*
- 2) Earl requested to see the list of parameters that you are considering adjusting in the calibration. I'd also like to see the list when possible (Jessica Winter @ NOAA).
- 3) Input data on upland sources
 - a) Spatial resolution
 - i) stormwater inputs are averaged over AFT grid cell areas, so over about a mile of shoreline. Karen indicated this could be a problem in that it would dilute the impact of a large pipe over ~dozens of HST cells. She suggests using some of DEQ's stormwater estimates. QEA should obtain data from DEQ on locations of key stormwater loads and attempt to integrate this into the model.
 - ii) No data on groundwater plumes for some chemicals, e.g. PCB 126. *How many chemicals do we have groundwater data for?*
 - b) NPDES permitted discharges: Kristine recommended using permit limits rather than measured discharges. Kevin was concerned that this would make it harder to calibrate the model to observations, since the data would be overstating the actual concentrations that were present in the water. However, Kristine is presumably worried that the discharges will increase up to permit limits in the future. To address both concerns, *is it possible to use observations for calibration and then use permit limits when we run the model into the future?* This could give us a predicted upper bound. Or, *could you consider both options in the sensitivity analysis* to see whether it makes a significant difference?
- 4) Data for calibration/validation: Water quality data used to assess model performance in the first round for PCB 126 was from 4 transects. Model should be calibrated and validated on a relatively fine spatial scale corresponding to the intended application (e.g. want to use it to determine whether MNR will work in a specific several-acre area). Additionally, dataset for validation should be independent of dataset used in calibration, thus we may need more data. I haven't seen the transect data to know how many measurements there are, what time of year they were taken, how they are distributed across the river, etc. *Do you think you need more data to do a useful calibration & validation? Could you use sediment concentrations in addition to water column concentrations?*
- 5) Sensitivity analysis will likely show very different results for different classes of chemicals (PCBs, volatiles, metals would all have different behavior because of partition coefficients, so some might be much more sensitive to f_{oc} than others, for example). *Do you plan to do a separate sensitivity analysis for each chemical? Or select a few representative ones?*
- 6) Additional features of the model that we could use if we need to, but currently aren't planning on using (because they'd require more inputs, or take more computation time...)
 - a) Kinetics package (rather than assuming equilibrium partitioning). Done on Hudson to simulate immediate post-dredge conditions. We're mostly interested in long-term results,

but we'd like to understand whether equilibrium conditions are a good assumption here. Can we compare water column concentrations from the transects with adjacent sediment concentrations to see if they're at equilibrium? (RI Table 2.2-5 indicates that there are 7 sets of water samples taken by LWG and analyzed for the chemicals of interest, along with a few other miscellaneous sampling events. I don't know whether these coincide spatially and temporally with sed sampling)

- b) Interactions between chemicals & parent/daughter degradation relationships between chemicals. How hard would this be to add? If we don't add it, how problematic is it? We are concerned about toxic degradation products. What do you think, Earl, Kristine, and Eric?

My comments on the May 2009 draft of the HST model, which they may have addressed in the last round of revisions, are as follows:

General: *when the modeling report (May 09) conflicts with the presentation to the modeling team (Sep 09) which is correct? I assume the more recent one, but see comment 6 below.*

1. According to the model, "nearshore areas are generally depositional environments but disturbance by anthropogenic activities is widespread" (p 7 of revised phase 2 model), i.e. some sediment is temporarily resuspended and then redeposits. If boat traffic-induced scour cannot be simulated in the model, identify this as a source of uncertainty to be carried through in the FS on a site-specific basis. Quantify how much area is affected by this, map it so that we know how it corresponds to potential remediation projects, and in each area, estimate the difference between model output and calibration/validation data. Estimate how far resuspended sediment might travel under a range of flow conditions.
2. Comparing model runs against empirical data, it is sometimes difficult to assess the ability of the model to represent the data because of the resolution of the bathymetry, which is +/- 7 cm. 7 cm over a 2 year model run (for validation, or a 1 year model run for calibration) is not negligible—at least on the Duwamish a deposition rate of 3.5 cm/yr would be considered enough to justify using MNR instead of active remediation, so should we be using longer model runs in order to get a better understanding of long term sedimentation/erosion trends and to reduce the effects of bathymetry measurement error?
3. *What does it mean that "the area modeled includes the entire LWR from RM0 - RM 24.1, however the modeling effort is focused on RM1-RM11.8"?* (2009 HST model report p 2) Do you model the whole area but only do calibration for this part, or calibrate over the whole area but only present results for this part, or assign more importance to this area in calibration somehow? Please clarify.
4. When comparing model vs. empirical data (e.g. in the spatial scale analysis), please use root mean squared error instead of arithmetic mean to assess model accuracy. Averaging overpredictions and underpredictions sitewide just tells us whether or not the model is biased, but does not tell us how precise the model is. Also, the Aug 09 presentation to EPA (ppt file) includes a spatial scale analysis slide - where is the spatial scale analysis in the HST model report? I couldn't find it in the 09, 06, or 05 reports.
5. Assess and discuss in the modeling report whether the number of Sedflume cores and their distribution is adequate to represent a 9-mile long site. How was the number 19 chosen? If 19 was chosen to achieve some statistical goal, is 14 (the number of cores actually used in

modeling cohesive sediment transport) too few? (16 coring sites were used on the Duwamish, which is about half the length of the Portland Harbor site.)

6. The May 2009 HST model report conflicts with the more recent (Sept 09) powerpoint presentation on the Portland Harbor Collaboration Portal website regarding interpolation of erodibility parameters to grid cells. Model Report lists 3 methods and uses the third (grouping cores) while the presentation says that erodibility parameters were assumed horizontally constant over the site. *Which method was used?*
7. Sensitivity analysis as described in the HST model report might better be termed initial calibration, because basically the modelers were looking at “what values of these parameters (e.g. drag on structures, deposition and resuspension rates) make the model work best.” Their analysis of different scenarios (high and low flow at upstream and downstream ends) would count as sensitivity analysis. However, sensitivity analysis and uncertainty analysis should be redone after the model is completely calibrated so that we can have a measure of how sensitive the calibrated model is to different inputs, and of how much uncertainty is associated with the final model as it will be used.

I also agree with Earl Hayter's comment regarding the WRSPADJ adjustment to erodibility parameters.